

NOAA-M System Mission Operations Requirements Document (SMORD)

February 2002



Prepared for:
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

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Mission Operations

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Preface

The *NOAA-M System Mission Operations Requirement Document (SMORD)* is maintained and controlled by the POES Program Configuration Control Board (CCB) and may be updated or revised only on approval by the CCB. Comments and questions regarding this SMORD should be directed to:

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Section 1 – Introduction

1.1 Purpose

The *NOAA-M System Mission Operations Requirements Document (SMORD)* shall be utilized to identify and convey National Aeronautics and Space Administration (NASA) Goddard Space Flight Center's (GSFC) Code 480 requirements to the National Oceanic and Atmospheric Administration (NOAA) in support of all NASA pre-launch, launch, and On-Orbit Verification (OV) activities for the NOAA-M spacecraft. Appendix B documents the task checklist to be followed by both NASA and NOAA.

1.2 Scope

The areas covered by this document are the Satellite Operations Control Center (SOCC), Polar Acquisition and Control System (PACS), Remote Ground Interfaces, and related hardware and software. The time period covered shall be from pre-launch through the completion of OV activities for the NOAA-M mission. In the event of any conflicts with previously existing SMORDs, this document shall take precedence.

1.3 Documentation

1. NOAA POES Database Development and Validation Plan and Procedures Document, LM-POES-001, Revision B, February 2001.
2. Polar Operational Environmental Satellite (POES) Program NOAA-M Launch Management Plan, February 2002.
3. Polar Operational Environmental Satellite (POES) Program Configuration Management Procedures (S-480-83), March 2000.
4. ATN Program Programming and Control Handbook for NOAA-KLM, June 2001.
5. Polar Operational Environmental Satellite (POES) Program NOAA-M Simulation Plan (S-480-145), December 2000.
6. NASA/NOAA Memorandum of Understanding NOAA-K, L, M, N, N' Post Launch Joint Operations, Draft, February 2002.
7. H. McCain (NASA) letter and document to G. Davis (NOAA), POES Data Analysis Laboratory Security Plan, June 25, 1996.
8. NOAA-M On-Orbit Verification and Support Plan, (S-480-149), November 2001.
9. NOAA/NESDIS Ground System Configuration Management Plan for Satellite Operations, Revision 1, February 1998.
10. NOAA-M End-to-End Test Plan, (S-480-123), May 2000.

Section 2 – NOAA-M SOCC and CEMSCS Requirements

The SOCC and the CEMSCS shall provide sufficient personnel, facilities, equipment, software, and procedures to be utilized in the evaluation of the spacecraft and instrument systems.

2.1 Personnel Requirements

All SOCC personnel shall perform duties and responsibilities as defined in the *POES Project NOAA-M Launch Management Plan* (Reference 2).

2.1.1 SOCC Control Room Staffing. NOAA shall provide control room staffing, as defined in the *POES Project NOAA-M Launch Management Plan* (Reference 2).

2.1.2 Test Director Support. NOAA shall provide a Test Director (TD) for all pre-launch simulations, launch operations, and OV activities.

2.1.3 NOAA Launch Readiness Manager. NOAA shall provide a Launch Readiness Manager (LRM) to coordinate all SOCC readiness activities with the NASA Flight Operations Manager (FOM).

2.1.3.1 NOAA LRM. The NOAA LRM shall ensure that all NOAA provided resources, as defined in the *POES Project NOAA-M Launch Management Plan* (Reference 2), are available and in-place to support all pre-launch, launch, and OV activities.

2.1.4 Maintenance Support.

2.1.4.1 Polar Acquisition and Control System Software Maintenance Support. NOAA shall provide PACS software maintenance support for all staffed shifts for the first five days of the mission, and on-call throughout the phase of the mission where NASA is responsible for health and safety of NOAA-M.

2.1.4.2 SOCC Hardware Maintenance Support. NOAA shall provide SOCC hardware maintenance support for all staffed shifts for the first five days of the mission, and on-call throughout the phase of the mission where NASA is responsible for health and safety of NOAA-M.

2.1.4.3 SOCC Facilities Maintenance Support. NOAA shall provide facilities maintenance support for all staffed shifts for the first two days of the mission, from launch minus 5 (L-5) hours to L+48 hours, and on-call throughout the phase of the mission where NASA is responsible for health and safety of NOAA-M.

2.1.4.4 SOCC Communications and Phone Service Maintenance Support. NOAA shall provide communications and phone service maintenance support for all staffed shifts for the first

two days of the mission, from L-5 hours to L+48 hours, and on-call throughout the phase of the mission where NASA is responsible for health and safety of NOAA-M.

2.2 Facility Requirements

2.2.1 Polar Operations Area. NOAA shall provide all required resources, as defined in the *POES Project NOAA-M Launch Management Plan* (Reference 2), in the Polar Operations Area (POA) necessary to support the NOAA-M OV activities.

2.2.1.1 POA Configuration. NOAA shall configure the POA, as defined in the *POES Project NOAA-M Launch Management Plan* (Reference 2), to support OV of NOAA-M, in conjunction with other real-time spacecraft (S/C) operations or launch activities.

2.2.2 Launch Control Room. NOAA shall provide all required facilities in the Launch Control Room (LCR) necessary to support the NOAA-M pre-launch, launch, and OV activities as defined in the *POES Project NOAA-M Launch Management Plan* (Reference 2). The pre-launch activities will include support of Thermal Vacuum (TV) Data Flow, System Electrical Performance Evaluation Test (SEPET) Data Flow, End-to-End (ETE) tests, and mission simulations.

2.2.2.1 LCR Configuration. NOAA shall configure the LCR, as defined in the *POES Project NOAA-M Launch Management Plan* (Reference 2), from L-90 days to completion of OV activities of the NOAA-M mission.

2.2.2.2 Real-Time Plots. NOAA shall provide a printer in the LCR to allow the printing of real-time plots.

2.2.2.3 Additional LCR Equipment. NOAA shall provide Flight Operations Team (FOT) personnel access to printers and plotting devices to snap CRT pages, generate history and trend plots, history and trend reports, real-time plots, and other PACS reports, to allow for data analysis.

2.2.2.4 Orbit Track. NOAA shall provide a personal computer (PC) in the LCR that has an orbit ground track program resident. The program will provide the capability to select different displays, adjust spacecraft orbital elements, and download spacecraft orbital elements off of the Internet.

2.2.2.5 Orbit Track Display. NOAA shall provide an overhead graphic display of the orbit ground track in the LCR for launch and OV support.

2.2.2.6 Voice Communication System. NOAA shall provide voice communication services in the LCR for launch and OV support as defined in the *POES Project NOAA-M Launch Management Plan* (Reference 2).

2.2.2.7 McMurdo Sound Remote PC. NOAA shall provide an Internet Protocol (IP) Local Area Network (LAN) connection for use with a NASA provided PC for remote McMurdo Sound (MCM) support in the LCR for launch and OV support.

2.2.3 SOCC Conference Room.

2.2.3.1 NASA Exclusive Use. The SOCC conference room shall be provided and available for exclusive around-the-clock use by the NASA FOT from L-2 days to handover.

2.2.3.2 NASA Priority Use. The NASA FOT shall have priority use of the SOCC Conference Room from L-90 days through completion of OV activities for the NOAA-M mission.

2.2.4 Training and Test Subsystem . NOAA shall ensure that the configuration of the Training and Test Subsystem (TTS) models the NOAA-M activities.

2.2.4.1 TTS Hardware and Software. NOAA shall configure the TTS simulator to support the latest Test Load Package (TLP) and Flight Load Package (FLP) within twenty working days of receipt of the TLP or FLP from GSFC.

2.2.4.2 Simulate Anomalies. NOAA shall ensure that the TTS simulator is able to simulate spacecraft anomalies.

2.2.5 Communication Links. NOAA shall configure the data and voice lines between the SOCC and NASA Integrated Services Network (NISN) from L-2 days to completion of OV activities for the NOAA-M mission, as well as during all pre-launch tests.

2.2.6 Command and Data Acquisition Interfaces.

2.2.6.1 Primary Capability. NOAA shall provide a primary capability for data acquisition, as well as clear text and encrypted command capability of the spacecraft, through the Wallops Island and Fairbanks Command and Data Acquisition (CDA) stations.

2.2.6.2 Alternate SOCC Capability. NOAA shall develop a contingency plan and procedures to establish an alternate SOCC at the Wallops Island CDA facility in the event that the Suitland SOCC should be rendered incapable of maintaining operational control of the spacecraft for an extended period of time (greater than 24 hours).

2.2.6.3 Loop-Back Capability. NOAA shall maintain loop-back capability to both Wallops Island CDA and Fairbanks CDA, the use of which will verify the correct encryption keys and operations of the Command Encryption Module (CEM).

2.3 Configuration Management Program Requirements

NOAA shall maintain a Configuration Management (CM) Program for the POES mission. The POES mission life cycle will include the pre-launch preparation, launch, activation, and evaluation, and on-orbit operations phases for each spacecraft.

2.3.1 CM Discipline. NOAA shall adhere to the CM discipline in accordance with the *POES Program Configuration Management Procedure* (Reference 3).

2.3.2 Freeze. The NOAA-M software and hardware shall be frozen no later than 48 hours prior to any scheduled test or simulation. This requirement may be waived by joint NASA and NOAA agreement.

2.4 Database Requirements

The following section defines the database requirements in support of the NOAA-M mission readiness effort.

2.4.1 POES Database Development and Validation Plan and Procedures Document. NOAA shall adhere to the *NOAA POES Database Development and Validation Plan and Procedures Document* (Reference 1), which addresses detailed database requirements, development, schedule, modification, validation, certification, audits, and status reporting.

2.4.2 Databases.

2.4.2.1 Level I PACS Databases. NOAA shall provide, no later than L-290 days, Level I certified NOAA-M PACS Databases.

2.4.2.2 Level III PACS Databases. NOAA shall provide, no later than L-110 days, Level III certified NOAA-M PACS Databases.

2.5 Data Management Requirements

NOAA SOCC shall receive and process the spacecraft subsystems and instrument data relayed from the CDA stations in both real-time and playback modes.

2.5.1 Real-Time Transmissions. NOAA SOCC shall receive and process real-time transmissions in six formats: High Resolution Picture Transmission (HRPT); Automatic Picture Transmission (APT); Advanced Microwave Sounder Unit (AMSU) Information Processor (AIP); Television Infrared Observation Satellite (TIROS) Information Processor (TIP); TIP Boost data, and TIP Orbit data. See the *Programming and Control (P&C) Handbook* (Reference 4) for format definitions.

2.5.2 Playback Data. NOAA SOCC shall receive playback data recorded on-board the spacecraft via the NOAA provided ground network. The data will consist of the following: Global Area Coverage (GAC), Local Area Coverage (LAC), Stored TIROS Information

Processor (STIP), Stored AMSU Information Processor (SAIP), and Boost data. See the *P&C Handbook* (Reference 4) for format definitions.

2.5.2.1 Post Pass Data Playback. NOAA shall maintain the capability for post-pass playback of CDA retrieved data throughout the NOAA-M OV period.

2.5.2.2 Data Segment. The NOAA CDA shall have the capability to playback the spacecraft dumped data to the SOCC one data segment at a time.

2.5.3 Data Handling, Storage, and Archival. NOAA shall ensure the PACS Telemetry and Command System (TCS) receives, processes, and forwards spacecraft telemetry data to the workstations for display and analysis.

2.5.3.1 OV Check-Out Period. NOAA shall archive all raw NOAA-M telemetry data during the OV checkout period.

2.5.3.2 On-Line Storage. NOAA PACS shall ingest real-time NOAA-M data (HRPT, TIP Orbit, TIP Boost, and AIP) and store on-line for at least thirty days.

2.5.3.3. Archived Data Restoration. NOAA shall restore requested NOAA-M archive data within one hour of the request.

2.5.3.4 Real-Time Data Flow. NOAA shall ingest TIP and AIP real-time SEPET data and archive that data for later retrieval.

2.5.3.5 Real-Time Data Flow. NOAA shall ingest real-time TIP and AIP TV test data and archive that data for later retrieval.

2.6 SOCC Testing and Verification Requirements

2.6.1 ETE Testing. NOAA shall support end-to-end tests with the spacecraft, as defined in the *NOAA-M ETE Test Plan* (Reference 10), to confirm the operational readiness of the NOAA-M ground system.

2.6.2 SEPET Testing. NOAA shall support SEPET testing, as defined in the test plans developed jointly by NASA and NOAA.

2.6.3 Thermal Vacuum (TV) Testing. NOAA shall support TV testing, as defined in the test plans developed jointly by NASA and NOAA.

2.6.4 Data Flows, Proficiency and Compatibility Tests. NOAA SOCC shall participate in data flows, as well as proficiency and compatibility tests.

Section 3 – NOAA-M Remote Site Interfaces

The NOAA-M ground system shall have the capability to interface with Deep Space Network (DSN) stations, Air Force Satellite Control Network (AFSCN) Remote Tracking Stations (RTS), the MCM station, the European Lannion station, the Tracking Data and Relay Satellite System (TDRSS), the remote workstation at GSFC, the remote workstations at the Lockheed Martin Space Systems Company (LMSSC) facility, and Building 836 at Vandenberg Air Force Base (VAFB), via the NISN port. The sections below describe the detailed requirements for support of remote site interfaces to the overall system.

3.1 POES Remote Site Services

The system shall have the capability to command and process telemetry data from each of the POES remote sites via the NISN port, as depicted in Table 3-1.

Table 3-1. POES Remote Sites Services

Remote Station	Service Type	Support Duration			
		First 24 hours	Activation	Evaluation	Mission life
DSN	Commanding Telemetry (Real Time)	X	X	Emergency Support Only	Emergency Support Only
		X	X	Emergency Support Only	Emergency Support Only
AFSCN	Telemetry (Real Time)	X	Emergency Support Only	Emergency Support Only	Emergency Support Only
MCM	Telemetry (Real Time)	X	X	As Required	As Required
	Commanding	X	X	As Required	As Required
Lannion	Telemetry (Real Time)	X	X	As Required	As Required
TDRSS	Telemetry (Real Time)	X		NA	NA
GSFC Workstation	Telemetry Analyses	X	X	As Required	As Required
LMSSC Workstation	Telemetry Analyses	X	X	As Required	As Required
Bldg. 836, VAFB	Telemetry (Real Time)	X	NA	NA	NA

3.1.1 DSN Telemetry Support. The system shall have the capability to process all real-time telemetry (TIP Orbit and AIP) data using NISN 4800 bit block format.

3.1.2 DSN Command Support. The system shall have the capability to command from DSN stations.

3.1.3 Simultaneous Command Support. The system shall have the capability to command while receiving telemetry and command echo data from DSN stations.

3.1.4 AFSCN RTS Telemetry Support. The system shall have the capability to process all real-time telemetry (TIP Orbit, TIP Boost, and AIP) data from the RTSs.

3.1.5 MCM Ground Station Telemetry Support. The system shall have the capability to process all real-time telemetry (TIP Orbit, TIP Boost, and AIP) data from MCM using the NISN 4800 bit block format via the National Science Foundation Network.

3.1.6 MCM Ground Station Command Support. The system shall have the capability to command from MCM.

3.1.7 Lannion Ground Station Telemetry Support. The system shall have the capability to process all real-time telemetry (TIP Orbit and TIP Boost) data via a direct transmission from Lannion in Europe.

3.1.8 TDRSS Telemetry Support. The system shall have the capability to process all real-time telemetry (TIP Orbit and TIP Boost) data received from TDRSS using the NISN 4800 bit block format.

3.1.9 GSFC Remote Workstation. The system shall provide transmission of all real-time telemetry (TIP Orbit, TIP Boost, and AIP) to the PACS workstation at the GSFC POES Project Office within 10 seconds after receipt at the SOCC.

3.1.10 GSFC Access to Archived Data. The system shall provide the PACS workstations at the GSFC POES Project Office with access to both on-line and off-line archived data.

3.1.11 LMSSC Remote Workstations. The system shall provide transmission of all real-time telemetry (TIP Orbit, TIP Boost, and AIP) to the PACS workstations at the LMSSC facility within 10 seconds after receipt at the SOCC.

3.1.12 LMSSC Access to Archived Data. The system shall provide the PACS workstations at the LMSSC facility with access to both on-line and off-line archived data.

3.1.13 Vandenberg Air Force Base (VAFB) Building 836. The system shall have the capability to process all NISN 4800 bit block formatted real-time telemetry (TIP Orbit and TIP Boost) received from Building 836 at VAFB.

3.1.14 VAFB Command Support. The system shall have the capability to send commands to the spacecraft at VAFB during ETE tests.

3.1.15 Other External Interfaces. The system shall have the capability of selective electronic distribution of telemetry, engineering data files, and plot output files to instrument vendors via Internet and computer compatible media, such as floppy disks.

NOTE: IBM PC compatible formats will be defined for each data type.

3.2 Communications

The system shall provide the communication capabilities as defined in Sections 3.2.1 and 3.2.2.

3.2.1 Switching, Conferencing, and Monitoring Arrangement (SCAMA) Circuits. The system shall support a minimum of four SCAMA circuits to be configured and used for communications with the DSN, AFSCN, and the LOCC and Building 836, at VAFB.

3.2.2 Phone Numbers and Points of Contact. NOAA shall provide phone numbers and points of contact for communications use with GSFC, DSN, MCM, AFSCN, LMSSC facility, and Lannion.

Section 4 – NOAA-M Polar Acquisition and Control System Requirements

4.1 Freeze. NOAA shall enforce a soft freeze and a hard freeze on both the PACS software and hardware at L-60 days and L-30 days, respectively. This requirement may be waived by joint NASA and NOAA agreement.

4.2 PACS Capabilities

4.2.1 Plot. PACS shall be capable of generating 20 plots per hour without degrading PACS performance and that each plot consists of up to four 16 second update rate parameters showing every sample for a three orbit period.

4.2.2 Real-time Plotting & Cathode Ray Tube Page Display. PACS workstations shall be capable of initiating real-time plots and Cathode Ray Tube (CRT) page displays within five seconds after being requested.

4.2.3 Workstations. PACS workstations shall be capable of supporting launch and OV activities as defined in the *NOAA-M On-Orbit Verification and Support Plan* (Reference 9).

4.2.4 POES Incident Reporting System. NOAA shall maintain a POES Incident Reporting System for tracking and resolving all PACS and CEMSCS NOAA-M launch related problems.

4.2.5 Error Correction. NOAA shall resolve all launch critical Polar Incident Reports (PIR) prior to launch.

4.2.6 AMSU Telemetry Processing. The system shall maintain solid lock on TIP data extracted from the HRPT downlink when the AMSUs are turned off.

4.2.7 DSN Processing. The system shall be able to interface with the DSN during launch and activation, and process a minimum of half the available pass time command and telemetry data for every scheduled pass.

4.3 PACS Software

PACS software shall support the following capabilities of the NOAA-M spacecraft.

4.3.1 Archival and Decommuration. PACS software shall support archival and decommuration of NOAA-M spacecraft telemetry.

4.3.2 Commanding. PACS software shall support all NOAA-M commanding.

4.3.3 Commanding and Telemetry Processing. PACS software shall support simultaneous NOAA-M commanding and telemetry processing through the DSN. During boost TIP mode, the 56K bandwidth cannot be exceeded.

4.3.4 Remote Workstations Support. PACS software shall support remote workstations at GSFC and LMSSC for NOAA-M.

4.3.5 Firmware. The system shall ensure that all telemetry can be displayed on the remote workstations at GSFC and LMSSC for NOAA-M.

4.3.6 PACS SW Releases. PACS shall be able to revert to previous NOAA-M software releases.

4.3.7 Boost Telemetry Processing. PACS shall decommutate and display Boost telemetry, as defined in the *P&C Handbook* (Reference 5), for NOAA-M.

4.3.8 High Speed Dwell Data Processing. PACS shall decommutate and display high speed dwell data, as defined in the *P&C Handbook* (Reference 5), for NOAA-M.

4.3.9 Command With Four Data Words. PACS shall process commands with four data words, as defined in the *P&C Handbook* (Reference 5), for NOAA-M.

4.4 PACS Hardware

4.4.1 PACS Hardware Modifications. PACS hardware shall support all capabilities of the NOAA-M spacecraft.

4.4.2 PACS Workstations. NOAA shall supply functional PACS workstations for use at GSFC and LMSSC (two workstations at both locations) for NOAA-M support.

Section 5 – NOAA-M Mission Operations Requirements

5.1 Flight Operations Team

5.1.1 Flight Operations Team Composition. NOAA shall provide the necessary FOT personnel in accordance with the *POES Program NOAA-M Launch Management Plan* (Reference 2).

5.1.2 FOT Responsibilities. NOAA shall ensure all members of the FOT perform duties in accordance with the responsibilities, interfaces and activities defined for each NOAA position in the *POES Program NOAA-M Launch Management Plan* (Reference 2).

5.2. Resources for Simulations, Training, Launch and On-orbit Verification. NOAA shall provide the resources (software, hardware, staffing, space, etc.) defined in the *POES Program NOAA-M Launch Management Plan* (Reference 2) to support simulations, training, launch and on-orbit verification of the NOAA-M spacecraft.

5.3. Command and Data Access. NOAA shall provide command and data access to the NOAA-M spacecraft for every orbit throughout the phase of the mission where NASA is responsible for health and safety of NOAA-M.

5.4. Flight Time Table Generation. NOAA shall generate a Flight Time Table (FTT) for the entire OV time period.

5.4.1. FTT Update. NOAA shall update the FTT (in part or in its entirety) to make additions and deletions, as well as to reflect changes in the launch date.

5.4.2 FTT Final. NOAA shall issue the final FTT 30 days after completion of OV.

5.4.3 Scheduling. NOAA shall provide a single FTT identifying all ground stations supporting launch and OV.

5.4.4 Simulation and Training Support. NOAA shall provide a preliminary FTT to support simulations and training exercises at L-100 days.

5.5. OV Planning Activities. NOAA shall participate in the daily OV planning activities, as described in the *POES Project NOAA-M Launch Management Plan* (Reference 2).

5.6 Nominal and Contingency Operations

5.6.1 Procedures. NOAA shall participate in the development of activation and evaluation phases nominal and contingency procedures.

5.6.2 NOAA Lead Engineer. NOAA shall provide a lead engineer to function as a primary interface with the NASA Mission Operations Manager (MOM) during the activation and evaluation phases of the mission.

5.7 OV Support Requirements

NOAA shall participate in OV activities via membership in the FOT.

5.7.1 Ephemeris Tapes. NOAA shall provide pre-launch ephemeris tapes (for possible launch dates) to NASA for LMSSC validation prior to launch and ephemeris load on launch day.

5.7.2 CEMSCS Data Products. NOAA shall provide CEMSCS data products on an orbit-by-orbit basis, sufficient to evaluate instrument performance as requested by the OV Team.

5.7.3 Level 1B Test Data Files. NOAA shall provide access to level 1B test data files in the NOAA-M format for each of the NOAA-M instruments.

5.7.4 Attitude Sensor and Retrospective Ephemeris Data. NOAA shall provide a file of attitude sensor data, and associated retrospective ephemeris data to facilitate testing of a NASA developed precision attitude determination capability for use in OV.

5.7.5 Electronic Access to CEMSCS Data. NOAA shall provide electronic access to CEMSCS data utilizing the NASA provided 10 Mbs link.

5.7.6 CEMSCS Data Volume. NOAA shall provide accounts with appropriate data volume privileges on CEMSCS for use by the OV data analysis team.

Section 6 – NOAA-M Training Requirements

6.1 FOT PACS Training. NOAA shall provide PACS training to the NASA Simulation Team as defined in the *Polar Operational Environmental Satellite (POES) Program NOAA-M Simulation Plan* (Reference 6).

6.2 TTS Training Utilization

6.2.1 TTS Availability. NOAA shall make the TTS available to the NASA Simulation Team to support training and simulations beginning at L-120 days.

6.2.2 TTS Priority. NOAA shall ensure that training and simulation activities have the highest priority for TTS use (next only to on-orbit operations) from L-120 days through launch.

6.2.3 TTS Operator. NOAA shall provide personnel to operate the TTS during all simulations, training, launch, and OV.

6.2.4 Training. NOAA shall provide TTS training to the NASA Simulation Team, as defined in the *POES Program NOAA-M Simulation Plan* (Reference 6).

6.3 Mission Simulations

6.3.1 Simulations. NOAA shall participate and support simulations as defined in the *Polar Operational Environmental Satellite (POES) Program NOAA-M Simulation Plan* (Reference 6).

6.3.2 Pre and Post-Simulation Meetings. NOAA shall ensure that all NOAA simulation participants attend the pre-simulation kick-off meeting, as well as the post-simulation debriefing.

Appendix A - Acronyms

ADACS	Attitude Determination and Control Subsystem
AFSCN	Air Force Satellite Control Network
AGC	Automatic Gain Control
AIP	AMSU Information Processor
AMSU	Advanced Microwave Sounding Unit
APT	Automatic Picture Transmission
ATD	Anomaly Test Director
ATNAGE	Advanced TIROS-N Aerospace Ground Equipment
CC	Communications Controller
CCB	Configuration Control Board
CDA	Command and Data Acquisition
CE	Command Engineer
CEM	Command Encryption Module
CEMSCS	Central Environmental Satellite Computer System
CI	Configuration Item
CM	Configuration Management
CP	Command Procedure
CROH	Control Room Operations Handbook
CRT	Cathode Ray Tube
DSN	Deep Space Network
DTS	Database Transformation Software
EMI	Electromagnetic Interface Testing
ETE	End-to-End
FCA	Functional Configuration Audit
FLP	Flight Load Package
FOM	Flight Operations Manager
FOT	Flight Operations Team
FTT	Flight Time Table
GAC	Global Area Coverage
GC	Ground Controller
GSFC	Goddard Space Flight Center
HRPT	High Resolution Picture Transmission
IP	Internet Protocol
LAC	Local Area Coverage
LAN	Local Area Network
LCR	Launch Control Room
LMSSC	Lockheed Martin Space Systems Company
LMP	Launch Management Plan
LRM	Launch Readiness Manager
MCM	McMurdo Sound
MDR	Mission Dress Rehearsal

Appendix A - Acronyms - continued

MOM	Mission Operations Manager
MOWG	Mission Operations Working Group
NASA	National Aeronautics and Space Administration
NESDIS	National Environmental Satellite Data Information Service
NISN	NASA Integrated Services Network
NOAA	National Oceanic and Atmospheric Administration
OV	On-Orbit Verification
PACS	Polar Acquisition and Control System
PC	Personal Computer
PCA	Physical Configuration Audit
PIR	Polar Incident Report
POA	Polar Operations Area
POES	Polar Operational Environmental Satellites
RTS	Remote Tracking Station
S/C	Spacecraft
SAIP	Stored AMSU Information Processor
SCAMA	Switching, Conferencing, and Monitoring Arrangement
SEPET	System Electrical Performance Evaluation Test
SMORD	System Mission Operations Requirements Document
SOCC	Satellite Operations Control Center
STIP	Stored TIROS Information Processor
STK	Satellite Tool Kit
TBD	To Be Determined
TCS	Telemetry and Command System
TD	Test Director
TDRSS	Tracking Data and Relay Satellite System
TIP	TIROS Information Processor
TIROS	Television Infrared Observation Satellite
TLP	Test Load Package
TTS	Training and Test Subsystem
TV	Thermal Vacuum
UIIS	Unique Instrument Interface Specifications
VAFB	Vandenberg Air Force Base

Appendix B – NASA/NOAA Launch Preparation Task Checklist

	L Minus Date (Days)	Task	NOAA Tasks	NASA Tasks	Comments
1	L -690	Establish Mission Within NESDIS Operations Based on Satellite Contract and Planned Launch Schedules	Establish Ground System Baseline (Define NOAA's Changes Planned and Completed Since Last Launch)	Establish Satellite Baseline (Define NASA's Required Ground System Changes to Support the Mission)	Provides Basis for Tracking Mission Status Readiness During Future Mission Operation Working Group (MOWG) Meetings
2	L -690	Prepare joint Mission Operations Milestones/Schedules	Coordinate and Approve Mission Operations Schedule. Provide Planned Launch Date. Prepare NOAA Spacecraft Users Guide.	Prepare, Coordinate, and Approve Mission Planning Milestones and Schedules Based on Contract Dates.	Establish Mission Operations Schedule and Milestones. Establishes Requirement For Satellite going into Storage, then Resuming Activities For Launch Support. Establish a formal review of schedules. Milestones/Schedules will include Thermal Vacuum Test, DSN and AFSCN Dataflows/Testing, Training Plan, Launch Management Plan, Systems Missions Operations Requirement Document, Database Validation Plan, Spacecraft and Instruments Handbooks, Flight Time Table, Flight Software Deliveries, End-to-End tests, Simulator upgrades, OV plan, Cops review, and where applicable ground system deliveries.

	L Minus Date (Days)	Task	NOAA Tasks	NASA Tasks	Comments
3	L-690	Establish Missions Operations working group process. This includes key personnel.	Provide NOAA Launch Readiness Manager	Provide Mission Flight Operations Manager	Baseline Mission Operations Schedule
4	L-689	Initial Pacs Database	Configure Pacs for new spacecraft.	Provide validated spacecraft ID for telemetry and command	Copy from an existing spacecraft/change spacecraft ID's. Use PACS Procedures for creating directories.
5	L-680	SEPET Preparation	Write SEPET Procedure for SOCC use. Review and Establish NOAA/SOCC Data Flow Test Plans.	Provide SEPET Test Plan to NOAA. Review and Establish NOAA/SOCC Data Flow Test Plans.	
6	L-600	First SEPET on Integrated Satellite (Spacecraft Bus and Mission Instruments)	Participate in First SEPET to Archive Raw Data.	Validate that SEPET Meets Contract Requirements.	Jointly Track Action Items and Schedules.
7	L-600	Provide Documentation on Spacecraft and the Instruments.	Review Instruments and Spacecraft characteristics.	Provide UIIS (Unique Instrument Interface Specifications) and Instrument Databooks. Delivery of Command and Telemetry Lists.	Deliver Documentation to NOAA Liaison Office at GSFC.
8	L-450	Pre-Environmental SEPET	Participate in Pre-Environmental Tests. Archive Raw Data.	Participate and Verify Pre-Environmental Tests.	Jointly Track Action Items and Schedules. Use procedures from SEPET Preparation L-680.
9	L-450	Electromagnetic Interference (EMI) Testing.	NOAA receives and reviews test report.	Verify Results of EMI Testing. Provide test report to NOAA Liaison at GSFC.	Jointly Track Action Items and Schedules

	L Minus Date (Days)	Task	NOAA Tasks	NASA Tasks	Comments
10	L-450	Vibration and Acoustic Testing	NOAA receives and reviews test report.	Verify Results of Vibration and Acoustic Testing. Provide test report to NOAA Liaison at GSFC.	Jointly Track Action Items and Schedules
11	L-450	Define Required Changes to Ground System to support spacecraft changes. Establish System Baseline for Launch	Generate new requirements. Update Ground System Baseline and establish priorities.	Generate New Requirements. Update Satellite Baseline (Validate NASA's Required Ground System Changes to Support the Mission)	Sources include Lessons Learned/New Instruments/Spacecraft deltas. Jointly Review and Approve New Requirements.
12	L-420	Validate new requirements	Approval by appropriate NOAA Office.	Approval by appropriate NASA Office.	This is a management level agreement on requirements.
13	L-380	Update Database Validation Plan	Provide input.	Provide input.	Joint NASA/NOAA document
14	L-360	End-to-End test	Review script. Support End-to-End Test	Generate script. Conduct End-to-End test	Jointly Track Action Items and Schedules
15	L-350	Begin Database Process			This starts the database effort. Critical milestone to database validation. Implements joint monitoring of status and configuration.
16	L-350	Begin Database Validation	Start Level I validation. Implement Tracking of Database Changes.	Deliver ATNAGE databases and supporting documentation as stated in the Database Validation Plan.	Deliver to NOAA Liaison Office at GSFC

	L Minus Date (Days)	Task	NOAA Tasks	NASA Tasks	Comments
17	L-350	Begin COPs	Write and review COPs	Write and review COPs	Ground and spacecraft COPs. NOAA has responsibility for ground COPs and NASA has responsibility for spacecraft COPs.
18	L-290	Level I Database delivery	Provide to NASA in Accordance with Database Validation Plan. Continue tracking of database changes		This includes: command, telemetry, boost telemetry, CPs, pages, and boost pages.
19	L-289	Begin Database Level II Validation	Update database as CCRs are received.	Begin Review of Database. Engineers review and generate CCRs.	
20	L-270	Thermal Vacuum Chamber Test preparation	Provide Test Media and other Logging Requirements for Thermal Vacuum Chamber Test. Includes in product processing requirements using test data. Write NOAA Thermal Vacuum Test procedures. Witness Thermal Vacuum Tests and Review Test Results	Implement NOAA Requirements. This includes: copy of TVAC Log Book to NOAA Launch Readiness Manager, provide wall clock time, copy of Thermal Vac test plan which includes test and step Numbers, notes from ATNAGE database and Command validation, brief description of all test anomalies, and description of test restarts. Validate Thermal Vacuum tests.	Provide Documentation as per requirements.

	L Minus Date (Days)	Task	NOAA Tasks	NASA Tasks	Comments
21	L-270	End-to-End test	Review script. Support End-to-End Test	Review script. Conduct End-to-End test	
22	L-240	Thermal Vacuum Chamber Test	Witness test and review test results	Validate test. Provide test report to NOAA Liaison Office at GSFC	
23	L-240	Systems Missions Operations Requirement Document	Provide input.	Provide Input	Written jointly.
24	L-210	Begin Training and Simulations Working Group	Provide Representative to working group.	Provide Representative to working group.	
25	L-200	Level II Database Review Complete	Implement Final CCRs	Submit Final CCRs to NOAA	Critical Milestone
26	L-180	Launch Management Plan	Provide input, review, and signatures.	Write, review, and signatures.	
27	L-180	Requirements Verification Matrix		Write Requirements Verification Matrix document	
28	L-180	NOAA Launch Call	NOAA to Provide Launch Call Notice and Good Day/Bad Day Analysis	Validate Launch Segment and Range Support Availability	Jointly Establish New Launch Date
29	L-180	Modify Training Plan	Verify lesson plans, scripts, training schedule, and simulator requirements.	Verify lesson plans, scripts, training schedule, and simulator requirements.	NASA is responsible for generating the training plan
30	L-180	Begin Flight Time Table (FTT) Working Group	Provide Representative to working group.	Provide Representative to working group.	NOAA is responsible for generating the FTT
31	L-170	Level II Database	Deliver to NASA		All CCRs incorporated

	L Minus Date (Days)	Task	NOAA Tasks	NASA Tasks	Comments
32	L-170	Begin Level III database validation	NOAA conducts Level III validation in accordance with the Database Validation Plan.		
33	L-160	Start of Control Room Operations Handbook (CROH) and Engineering Manual.	Develops CROH and Engineering Manual.		Validate Delivery of Documentation
34	L-150	Flight Operations Team Training	Provide facilities. Provide member of Flight Ops Team as required.	Provide Training as per Training Plan.	Classroom - includes NASA, NOAA, and LMSSC
35	L-120	On-Orbit Verification (OV) and Support Plan	Review	Generate and deliver final copy.	Deliver to NOAA Liaison Office at GSFC
36	L-120	OV Test Description & Analysis Plan		Deliver draft copy	Needed as input to preliminary FTT
37	L-120	TTS availability	Make TTS available for simulations and training		
38	L-110	Delivery Level III certified database	Install in PACS - Deliver to NASA	Verify database	
39	L-100	Provide Preliminary Copy of FTT	Provide FTT.	Provide FTT	
40	L-90	Pre-ship SEPET	Archive Raw Data. NOAA receives and reviews test report.	Verify Results of Pre-ship SEPET.	Jointly Track Action Items and Schedules
41	L-90	COPs completed	Review COPs	Deliver Final COPs.	Completed prior to start of simulations
42	L-90	OV Test Description & Analysis Plan	Review	Generate and deliver final copy.	Deliver to NOAA Liaison Office at GSFC

	L Minus Date (Days)	Task	NOAA Tasks	NASA Tasks	Comments
		Analysis Plan		copy.	GSFC
43	L-90	Begin Simulations	Participate in simulation activities as defined in the simulation plan.	Participate in sim activities as defined in the simulation plan.	Will include NASA, NOAA, and LMSSC personnel
44	L-83	Instrument OV Exercises	Provide facilities, personnel if needed.	Execute simulation plan	Document FOT members for Certification.
45	L-75	Dress Rehearsals	Provide facilities, personnel if needed.	Conduct in accordance with the simulation plan	
46	L-60	Deliver NOAA Spacecraft Users Guide Handbook	Prepare Document.		Only required for Data Formats on New Series or a change in a Data Format.
47	L-60	CROH	Distribute completed draft copy for review		
48	L-60	Deliver Program and Control Handbook (updates for NOAA-M)	Launch Readiness Manager to distribute to applicable personnel	Deliver document	Deliver to NOAA Liaison Office at GSFC
49	L-60	Conduct Ground Segment Readiness Review	Conduct internal Review and Signoff of Launch baselines		
50	L-60	Soft hardware and software freeze on ground system	Only Critical PIRS are addressed. Enforce and approve any changes to baseline.	Only Critical PIRS are addressed. Enforce and approve any changes to baseline.	
51	L-45	Instrument 1B Data	Produce 1B datasets and deliver to NASA	Review 1B Datasets.	IPD Processes Thermal Vacuum Instrument Data.
52	L-35	Network Operations Simulation	Provide facilities, personnel if needed.	Conduct in accordance with the simulation plan	
53	L-30	Hard Freeze			

	L Minus Date (Days)	Task	NOAA Tasks	NASA Tasks	Comments
54	L-30	Deliver Alignment and Calibration Handbook		NASA to deliver to NOAA Liaison Office at GSFC. Generate CCRs for any database changes.	
55	L-30	COPs Ready for Launch.		Deliver Final Copy.	
56	L-30	Post Ship SEPET	Archive Raw Data. NOAA receives and reviews test report.	Verify Results of Post-ship SEPET. Provide test report to NOAA Liaison at GSFC.	Jointly Track Action Items and Schedules
57	L-30	End-to-End test	Implement Test Plan	Implement Test Plan	
58	L-30	Final Flight Load Package	Install in PACS. Build a New Spacecraft Load.	Deliver to NOAA liaison	Deliver to NOAA Liaison Office at GSFC
59	L-30	Ephemeris	Engineer generate final		
60	L-30	Dress Rehearsals	Provide facilities, personnel if needed.	Conduct in accordance with the simulation plan	Includes LMSS, NASA, NOAA
61	L-30	FTT	Generate first full FTT		
62	L-29	Configuration Management of Ground System Audit.	Perform Audit of PACS.		This includes: dbs, pages, procs, antenna controller s/w, etc.
63	L-2	Dress Rehearsals	Provide facilities, personnel if needed.	Conduct in accordance with the sim Plan.	
64	L-1	Daily planning meetings	Provide Representatives.	Provide Representatives.	Identify to FTT, schedule changes, OV changes
65	L-0	Support Launch	Support as defined in the Launch Management Plan	Support as defined in the Launch Management Plan	
66	L+1	Day 1 Elements from FDF			Update schedules and loads if necessary
67	L+20	Pre-Handover Review	Conduct technical review to determine if NOAA is ready to accept Operational	Complete activities for handover.	Includes CCRs, procedures, and database items.

	L Minus Date (Days)	Task	NOAA Tasks	NASA Tasks	Comments
			accept Operational Responsibility.		
68	L+21	Handover	Assume Operational Responsibility	Provide letter and briefing to NOAA Management.	
69	L+45	OV Testing complete			Close out FTT
70	L+75	Final FTT	Issue final FTT		
71	L+90	OV Test Results			Verbal Presentation
72	L+150	OV Test Results			Written reports